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Brief 65-10051

# NASA TECH BRIEF



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## Metal Sheath Improves Thermocouple Using Graphite in One Leg

**The problem:** Design of a thermocouple with high EMF output and good reproducibility that is rugged and moistureproof. Combinations including graphite have exhibited more than 10 times the EMF output of other available thermocouples but have proven fragile and subject to change in EMF due to absorption of moisture and contaminants.

**The solution:** Thermocouples using graphite in one leg are enclosed in a moistureproof metal sheath.

**How it's done:** After assembly the thermocouple is baked out to eliminate all moisture and then sealed in a metal sheath. Lead wires from the elements are brought out through moistureproof seals. The metal sheath gives the thermocouple mechanical strength.

### Notes:

1. A graphite-silicon carbide combination has an EMF output of 0.5 volt at 3000°F while a graphite-boron carbide device has an output of 0.7 volt at 4530°F.
2. Inquiries concerning this innovation may be directed to:

NASA Space Nuclear Propulsion Office  
Technology Utilization Branch  
U.S. Atomic Energy Commission Bldg.  
Germantown, Maryland  
Reference: B65-10051

**Patent status:** NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: Westinghouse Electric Corporation  
under contract to NASA Space Nuclear  
Propulsion Office (NU-0011)

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